

Proposed Amendments to the Chromium Plating ATCM

September 28, 2006

California Environmental Protection Agency



Air Resources Board

Outline

- Background
- Proposed amendments
- Benefits and impacts
- Comments
- Proposed modifications
- Recommendation



Background



Hexavalent Chromium

- Identified as a Toxic Air Contaminant (1986)
- Extremely potent human carcinogen with no level of exposure considered safe
- Inhalation causes lung cancer
- Because of potency, grams of emissions pose significant risk

Carcinogenicity of Chromium(VI)

- Cr(VI) is a known human carcinogen (IARC, U.S. EPA, NTP)
- Dozens of worker studies show high risk of lung cancer in chromate production, chrome pigment and chrome plating industries
- Very potent carcinogen in humans
- Causes genetic (DNA) damage in many studies

Chromium (VI) Toxicity

- Cr(VI) is a sensitizer – causes workers to become allergic
 - Dermatitis in workers
 - Known occupational asthma hazard
- Cr(VI) also increases the risk of noncancer respiratory disease
 - Decreased lung function
 - Damage to lining of nose and airways

Hexavalent Chromium Potency Comparison

Carcinogen	Relative Potency
Dioxin	250
Hexavalent Chromium	1
Cadmium	0.03
Diesel Exhaust	0.002
Benzene	0.0002
Perchloroethylene	0.00004

Cancer Potency Factor

- The cancer potency factor of 0.15 per $\mu\text{g}/\text{m}^3$ was generated by Cal/EPA's OEHHA (DHS) using human studies
- Recent new human studies were evaluated
 - Similar potency obtained
 - Reinforced status of Cr(VI) as potent human carcinogen

Risk Management

■ Airborne Toxic Control Measures

- ☐ Chrome Plating and Chromic Acid Anodizing – (1988/1998)
- ☐ Cooling Towers (1989)
- ☐ Motor Vehicle & Mobile Equipment Coatings (2001)
- ☐ Thermal Spraying (2004)

■ District Regulations

- ☐ SCAQMD Rule 1469 relating to chromium plating and chromic acid anodizing (2003)

Regional Risk Significantly Reduced

- Ambient levels have been reduced by almost 70% since 1992
- Ambient levels continue to be stable and low

Near-Source Risk

- ATCM reduced emissions from plating and anodizing by requiring either 95% or 99% control
- However, 30% of facilities have estimated cancer risk ≥ 10 /million exposed people

What is Chrome Plating?

- Three processes
 - ☐ Hard
 - ☐ Decorative
 - ☐ Chromic Acid Anodizing
- Parts are placed into a solution containing chromium and electricity is applied
- Electricity causes chromium in solution to “plate” onto the part

Functions Provided by Plating or Anodizing

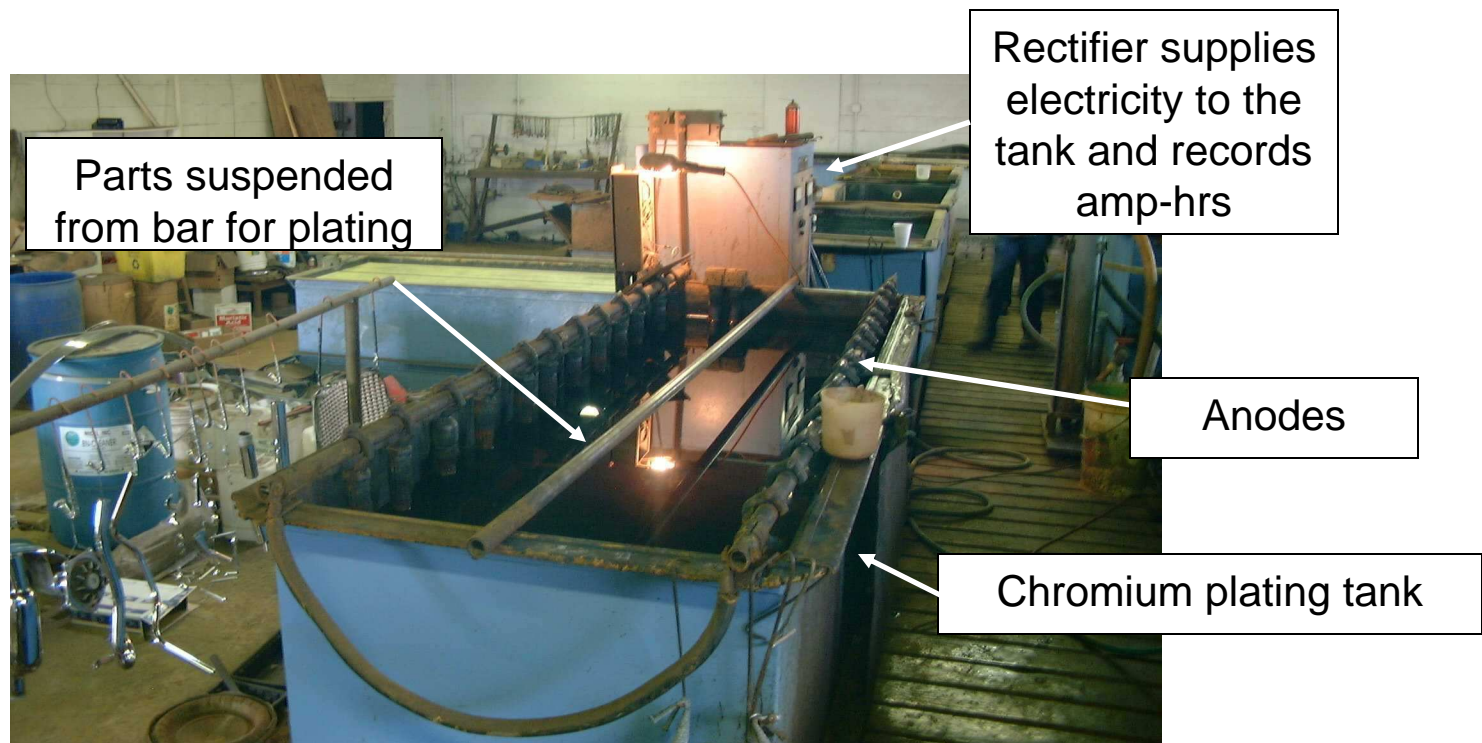
Hard	Decorative	Anodizing
Thick layer providing corrosion protection	Thin layer providing a decorative / protective finish	Chemical process providing corrosion and abrasion resistance



Distribution of Facilities

- Decorative chromium plating: 55%
- Hard chromium plating: 25%
- Chromic acid anodizing: 20%

Chromium Plating Tank



Industry Characterization

- 220 active hexavalent chromium facilities
- 10 facilities use the trivalent chromium process
- About half are small businesses
- 75% of facilities located in the SCAQMD

Potential Emissions Depend on Throughput

- Throughput is measured in ampere-hours
- Wide distribution in facility size based on ampere-hours

Distribution of Throughput

Throughput (ampere-hours)	Number of Facilities
$\leq 20,000$	48
$>20,000 - \leq 200,000$	60
$>200,000 - \leq 1 \text{ Million}$	45
$>1 \text{ Million}$	67

Control Methods in Use

- In Tank Controls
 - Chemical Fume Suppressants
 - Polyballs
 - 115 facilities
 - Primarily decorative chromium plating



Control Methods in Use

- Add-on Controls
 - Composite Mesh Pads
 - Scrubbers
 - High Efficiency Particulate Arrestor (HEPA) Filters
 - 69 facilities
- Combination of Controls



Staff Evaluation of BACT

- Emission rate equivalent to that achieved by HEPA filter systems
 - For intermediate and large facilities
- Specific chemical fume suppressants
 - For small facilities

Need for Further Control

- Modeling indicates near source exposures are elevated
- 43% of facilities within 100 meters of a sensitive receptor
- Low-income and ethnically diverse communities may be disproportionately impacted
- BACT can reduce risks significantly

Estimated Near-Source Cancer Risk with Existing Rules

Estimated Cancer Risk per Million*	Percent of Facilities
1 to 10	30
10 to 100	26
Above 100	3

* Reflects implementation of Rule 1469 in SCAQMD

Proposed Amendments



Key Elements of the Proposal

- Applies BACT
- Provides cancer risk reduction of up to 85% for existing individual facilities
- Significantly reduces hexavalent chromium exposure from new facilities
- Housekeeping provisions reduce fugitive emissions

Emission Limits for Existing Facilities

Annual Permitted Ampere-Hours	Sensitive Receptor Distance	Emission Limitation	Effective Date
$\leq 20,000$	Any	Use Specific Chemical Fume Suppressant	Six Months
$>20,000$ & $\leq 200,000$	≤ 100 meters	0.0015 mg/amp-hour	Two Years
$>20,000$ & $\leq 200,000$	> 100 meters	0.0015 mg/amp-hour	Five Years
$>200,000$	Any	0.0015 mg/amp-hour*	Two Years

* Must be met using an add-on control device

Requirements for New Facilities

- New facilities
 - Prohibits operation in areas zoned residential or mixed use, or within 150 meters of the boundary of any such area
- New hexavalent chromium facilities
 - Install HEPA filter and meet an emission rate of 0.0015 mg/amp-hr
 - Conduct site specific risk analysis

Additional Requirements

- Housekeeping measures
- Training requirements
- Prohibit sale and use of chromium plating kits by untrained persons

Proposed Compliant Chemical Fume Suppressants

- Compliant chemical fume suppressants
 - Benchbrite CR 1800® (Benchmark Products)
 - Clepo Chrome® (MacDermid)
 - Fumetrol 140® (Atotech U.S.A.)
- Reduce emissions to no more than 0.01 milligrams/ampere-hour

Other Proposed Amendments

- Modified and new definitions
 - Sensitive receptor - any residence; education resources; daycare centers; and health care facilities
- Organizational
 - Number sections consecutively

Other Proposed Amendments

- Exemptions
- Trivalent Chromium Plating and Enclosed Hexavalent Chromium Plating Tanks
- Parameter Monitoring, Inspection and Maintenance, Recordkeeping, Reporting, Alternatives
- Appendices



Benefits and Impacts

Near-Source Cancer Risk Reduction

Risk Level	Before	After
Greater than 100/million*	6	0
Greater than 10/million*	63	17

- Percent of facilities with cancer risk of one or less increases from 40% to 74%

* Reflects implementation of Rule 1469 in the SCAQMD

Environmental Justice

- Low-income and ethnically diverse communities will benefit

Environmental Impacts

- No significant adverse environmental impacts identified

Cost Impacts

- Total cost of \$14.2 million
- Capital cost of \$9.6 million
 - Based on installation of 89 HEPA systems
 - Flexibility may reduce cost for intermediate-sized facilities
- Ongoing costs of \$3.6 million per year
- Reporting, source testing, permit renewal, etc. cost of \$1.0 million

Individual Facility Cost Impact

- About 60% of the facilities already in substantial compliance
- Costs for facilities installing add-on control devices
 - Range: \$45,000 - \$215,000
 - Average: \$50,000

Profitability Impacts

- Costs for some individual businesses are significant and may adversely impact their profitability
- Loan guarantee program available
- No new costs after first year for 60% of facilities



Comments



Comments on the Proposal

- Costs of the proposal are high
- Hexavalent chromium emissions from plating/anodizing represent less than 1% of the inventory

Comments on the Proposal

- Adopt the provisions of Rule 1469 statewide
- Flexibility to comply without add-on controls should be allowed for all facilities
- All facilities should be required to install HEPA filtration systems

Comments on the Proposal

- Decorative plating facilities should be required to use trivalent chromium
- Proposal should address situations where people “move in” close to a facility
- Cumulative impacts should be addressed
- New facilities should have a 300 meter separation requirement rather than 150 meters



Proposed Modifications

Proposed Modifications

- Separation for new facilities
 - Increase spacing from 150 to 300 meters
 - Delete spacing requirement for new trivalent chromium plating facilities
 - Require facility-wide site specific risk analysis instead
- Training
 - Clarify that the owner or one current employee would need to attend
- Require use of specified chemical fume suppressants in the interim

Proposed Modifications

- Clarify that the emissions limits apply to each 'tank' rather than 'facility'
- Measurement to nearest sensitive receptor that exists on the effective date of the regulation is to be conducted once
- Site specific analysis waived if already completed, representative of current emission rate, and approved by permitting agency
 - Clarify that the analysis is a health risk analysis
- Other clarifying amendments



Recommendation

Recommendation

- Adopt the proposed amendments to the ATCM with modifications suggested by staff